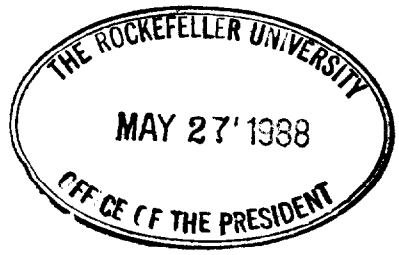

23 May 1988

Dr. Joshua Lederberg
The Rockefeller University
1230 York Avenue
New York, NY 10021-6399

Dear Dr. Lederberg:

I was pleased to receive your letter and to learn that there is still interest in the time-honored Weil-Felix reaction. Yes, a carbohydrate is involved in the cross-reaction between rickettsiae and Proteus antigens. No, there is no evidence that the two bacteria are otherwise related. Not all the evidence for these assertions has been published. Described below is some detail of the experiments which allow us to come to these conclusions.

In 1985 Robert Goldwasser spent some time in our lab. He brought with him a fair number of patients' sera from Israel, which we tested for Legionella antibodies. To our surprise, quite a few reacted with L. bozemanii, a species which has not been isolated very often in Israel. It turned out that these sera, but not other sera, reacted also with Rickettsia typhi. In other words, endemic typhus infection, which occurs in Israel with moderate frequency, elicits antibodies not only to rickettsiae but also to L. bozemanii. These results have been confirmed by appropriate cross-absorption tests. (See Isr J Med Sci 22: 131-138, 1986.) Several of my colleagues proceeded to identify by modern technology the carbohydrate moiety of the LPS responsible for the cross-reaction between rickettsiae, L. bozemanii, Proteus OX19, and other bacteria. This work is now being submitted for publication. Still unknown is the mechanism by which in evolutionary history, the same glycosyl transferase has appeared in (or transferred to) so many different bacteria.

Brenner et al (J. Bacteriol. 98: 637-650, 1969) showed that there is some similarity in polynucleotide sequence between E. coli and Proteus mirabilis and P. vulgaris. This was recently confirmed in the laboratory of Carl R. Woese (see his review in Microbiol. Rev. 51: 221-271, 1987), who with his associates has studied 16S rRNA nucleotide sequences in a great number of bacteria. Although not specifically stated in the review, Proteus, as other enterics, belongs in the gamma-subdivision of the purple bacteria. Weisburg and Woese have extended the 16S rRNA analysis to the rickettsiae with some of the nucleic acids that my colleagues and I have furnished. Some of this work has been published (Science 230:556-558, 1985), the rest is being prepared for publication now. Members of the genera Rochalimaea and Rickettsia clearly belong in the alpha-subdivision of the purple bacteria. Thus, Proteus and Rickettsia are not related.

I hope that this will answer your query. Do not hesitate to call on me if there should be any further questions. With best regards,

Sincerely,

Emilio Weiss

Emilio Weiss
3612 Raymond Street
Chevy Chase, MD 20815